

human distribution and modes of life and thought in Palestine, where history reaches back to a far remoter period than in most lands. Eight months of the spring and summer of 1909 were spent in traversing the country in many directions; and since the rainfall was exceptionally deficient in the early months of that year, the struggle for subsistence on the margins of the more arid portions was strongly emphasised.

The first half of the book deals with the form of the different parts of Palestine, and its relation to the geological structure on one hand, and the distribution, occupation, and past history of the inhabitants on the other. It is this physical basis that distinguishes the present volume from many descriptions of the same region. The isolated plateau of Judæa is indicated as the heart of the land from its isolated and uplifted position, in which it stood apart from the great highways of trade which passed to the north and to the south of it, while the moisture from the Mediterranean gave it a moderate fertility. On the west the broken foothills of the plateau form a transition zone, the Shephelah, between the plateau and the coastal plain alternately controlled by the Hebrews of the highland and the Philistines of the sea margin. But on the west, facing the valley of the Jordan on the leeside of the plateau, rainfall rapidly diminishes, and the desert conditions are sharply contrasted with the comparative fertility of the Shephelah but five and twenty miles away. Similarly the present form of Samaria, due to original folding worn down by erosion to a peneplain which has since been elevated and partially dissected, has opened this portion of the land to the peoples of the East, the coast-dwellers, and traders from Africa, so that the great trade routes and the routes of armies passed through it. The peculiar characteristics of Phœnicia, of Bashan, of Galilee, of the Dead Sea depression and the neighbouring deserts, are in like manner brought out and illustrated by the author's own travels through them and the incidents therein noted, presenting a most vivid picture of the land and the influence of its form on the history of its inhabitants.

In the second half of the book Prof. Huntington treats more especially of the climate of Palestine and reviews the present-day conditions, which he contrasts with the more favourable ones which existed, in his opinion, at an earlier date. He has put forward the same hypothesis in relation to central Asia, Greece, and Asia Minor, on previous occasions, giving numerous data in support of a modification of climatic conditions during the past twenty or thirty centuries. The lines of evidence reviewed are (1) the density of the population of Palestine at various periods; (2) the distribution of woodland; (3) ancient migrations, trade routes, and lines of invasion; (4) the distribution, location, and water-supply of abandoned sites; (5) the fluctuations of the Dead Sea.

Under the semi-arid conditions which prevail over the greater part of the country, and the strictly seasonal character of the rainfall, even small departures from the normal amount react powerfully on the economic conditions throughout the area, so

that there must always be a strong inclination to postulate definite deterioration of climate where signs of former occupation now abandoned are to be seen. Some of the caravan routes in northern Africa, now but little used, give little sign of their practicability for the great caravans which we know used them a few decades ago, but which altered economic conditions have suppressed. Human settlements cannot always furnish evidence that all in a given spot were occupied at the same time, and the preservation of perishable objects affords some testimony that past rainfall was not of great abundance. The author argues that there have been pulsations in the rainfall, dry periods succeeding others of greater humidity; and that, on the whole, in Palestine a diminution of rainfall from the earliest historical times to the present era has been in progress, while the pulsations within these periods often coincide with great race movements.

The importance of these alternations of dry and humid periods of moderate intensity will be generally admitted, and on the margins of desert regions the effects will be most strongly marked; but while their reality is beyond question, and the evidence for a certain decrease in the average total rainfall from the earlier historic times to the present day is obtainable in certain areas, the direct connection of race movements with such climatic variations at certain periods of history seems to be scarcely established as yet. But in any case, a most valuable summary of the subject as it relates to Palestine is given, and a survey of the history of it and the surrounding lands furnishes occasion for indicating race movements and events which apparently coincide with more or less favourable conditions of climate. An orographical map, as well as a photograph of a model of Palestine, enables the form of the land to be appreciated, and the photographs are most instructive, though the geographer will wish they had been larger. The diagrams in the text suffer from the paper being unsuited to this form of illustration.

H. G. L.

A GUIDE TO ELECTRICAL TESTING.

Testing of Electromagnetic Machinery and other Apparatus. By B. V. Swenson and B. Frankenhof, assisted by J. M. Bryant. Vol. ii., Alternating Currents. Pp. xxvi+324. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1911.) Price 11s. net.

"THE efficient direction of any industry to-day demands a very large amount of technical knowledge which cannot be learned at the bench or in the shops."

With this quotation, taken from the writings of Prof. J. B. Johnson, the authors dedicate their work to his memory, and this also gives the keynote to the book. It is essentially a guide to electrical testing, so that the reader may be fitted for that particular technical knowledge which is required in the test-room of a modern electrical engineering works. The reader must, however, not be a beginner; on the

contrary, he must be familiar with the scientific side of electrical engineering generally, so that all he needs is a kind of finishing-touch in his technical education which will make his work in a particular direction more efficient.

In the book under review this finishing-touch is given in the matter of testing alternating-current machinery and apparatus. In all there are 127 tests described. In each case the description begins with references to the literature on the subject; then is stated the object of the test, and after that comes a short dissertation on "theory and method." In some cases the authors add suggestions as to the collection of data, the plotting of curves, the extension of the test to somewhat different cases, and questions as to the effect of varying some of the conditions of the standard test. All this is extremely useful to the advanced student, but only to him. A beginner could only blindly follow instructions, and could not grasp the true scientific meaning of the thing he is doing.

It is perhaps natural that in a book written, in the first instance, for the students of an American university, methods and tests devised by American engineers should receive more attention than equally good work done in Europe; but when the authors christen old and well-known methods by American names, they go a little further in the direction of local patriotism than is warranted. As an instance, I take the Joubert method of taking the E.M.F. and current curves of an alternator. After describing the original method (by the way, the authors spell the name Jobert), where a ballistic galvanometer is used, they describe a "Bedell method" and a "Mershon method." Both these are nothing else than the Joubert method as it has been used for a generation in Europe. In the former, the ballistic galvanometer is replaced by a condenser and electrostatic voltmeter, and in the other by the well-known device of a potential slide and D.C. voltmeter.

Again, some methods which originated in Europe are either ignored or mentioned without reference to the inventor. Thus the well-known Sumpner method of testing transformer efficiency under full load whilst only the lost power need be supplied from outside, is given without Dr. Sumpner's name being mentioned. These are, however, minor blemishes; the important thing is that the authors have given us a valuable collection of accurate tests which can be carried out with such apparatus as may reasonably be supposed to be available in the test-room of a modern electrical engineering works.

GISBERT KAPP.

EDIBLE FATS.

Edible Fats and Oils: their Composition, Manufacture, and Analysis. By W. H. Simmons and C. A. Mitchell. Pp. viii+150. (London: Scott, Greenwood and Son, 1911.) Price 7s. 6d. net.

FAT enters into human food in a considerable variety of forms, and the modern tendency is to increase the variety. Whilst in earlier days the

animal products—butter, lard, and dripping—were the principal fats consumed as foodstuffs, in recent times a large number of vegetable oils and fats have also been brought into use for the same purpose. New oils and "butters" have been found; improved processes of purification have been introduced; and the industry has become one of notable magnitude. It has greatly augmented, and therefore cheapened, the supply of fat available for human consumption.

What the authors have done in the volume before us is to collect from various sources particulars of the edible fats and oils now in use, and arrange them in a convenient form for reference. These particulars include short descriptions of the origin, manufacture, physical and chemical characters, and methods for the analysis of the various products dealt with, which fall into the four main classes: butter, lard, butter-substitutes, and salad-oils. From the scope of the book, however, the descriptions are necessarily often meagre. They would serve well as an introduction to the subject, or for easy routine work in examining the various articles, but would require to be supplemented in the more difficult cases which are met with in practice.

A somewhat curious analogy is recalled by the name of Mège-Mouries, mentioned in connection with the origin of butter-substitutes. The production of beet sugar, which has now reached very large dimensions, is said to owe its early development to the encouragement given it by Napoleon I. in his policy of making France independent of foreign supplies. Now, just as this variety of sugar has supplemented and partly ousted cane sugar, so margarine has supplemented and partly supplanted butter; and the introduction of margarine we owe to investigations fostered by Napoleon III.

M. Mège-Mouries was commissioned by this monarch to find, if he could, a cheap but wholesome substitute for butter, to be used by the French poor. He eventually succeeded in doing this, utilising the softer portions of beef suet for the purpose. Later, owing to scarcity of this ingredient, it became necessary to include a proportion of vegetable oils, and this has led to a greatly extended consumption of such oils. The margarine industry is now quite a considerable one, the annual importations into this country alone being valued at more than two millions sterling.

If we consider the effect which the production of beet sugar and of margarine has had, first in augmenting the supply of foodstuffs for the human race in general, and secondly in benefiting the agriculture of the particular countries engaged in the production; and if we further remember that this effect, so far as can be foreseen, is destined to continue, from year to year and generation to generation, is it altogether paradoxical to suggest that the two Napoleons' claims to remembrance might justly be based less upon their military operations than upon their vicarious attentions to sugar and margarine? If the swords have not been beaten into ploughshares, they have perhaps been beaten by them.

C. S.